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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,030	06/15/2006	Armin Gerhard Aberle	SFCE 302	6758

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EXAMINER	
TRINH, THANH TRUC	
ART UNIT	**PAPER NUMBER**
1725	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/553,030	ABERLE ET AL.	
	Examiner	Art Unit	
	THANH-TRUC TRINH	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/30/2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6,8,9 and 11-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 6,8,9 and 11-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/30/2010 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in Graham **v.** John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-2, 4, 6, 9, 11 and 19 rejected under 35 U.S.C. 103(a) as being unpatentable over Marumoto et al. (JP 08-67535, see machine translation).

Regarding claims 1, 2, 6, 8-9, 11 and 19, as seen in Figure 1, Marumoto et al. discloses a method of texturing a glass surface and glass surface formed by the method. The method comprises the steps of:

- coating the glass surface (see SiO_2 glass substrate 1 in Figure 1, paragraphs 0008-0009) with a metal film (see layer 2 of Ni-5% Al in abstract, paragraphs 0001, 0009 and 0016. It), wherein the glass surface initially flat (see glass substrate 1 in step 1 of Figure 1). SiO_2 glass is quartz glass.
- stimulating a reaction at the interface between the glass and the metal film in the formation of reaction products at the interface (e.g. by way of thermal treatment or thermal annealing as layer 2 is formed by thermal spray, or coating followed by sintering, see paragraphs 0002, 0009, 0014 as Marumoto et al. describes the particles from thermal spraying form fusion or a compound between the metal and the substrate face and bit (or corrode) the substrate surface in paragraph 0002, or the reaction occurs between the coat 2 and glass substrate 1 in paragraph 0014). Marumoto et al. discloses reaction occurred between the metal coating and the glass substrate, and the glass substrate is textured (see paragraph 0002, 0014),

therefore it must be resulting in the formation of reaction products at an interface between the glass and the metal film such that an interfacial surface of unreacted glass at the interface is textured.

- removing the metal film (e.g. layer 2) and the reaction products from the glass surface. (See step 3 of Figure 1, and paragraph 0010).

Marumoto et al. teaches coating the glass substrate with metal film containing aluminum (see abstract, paragraph 0001, 0009 and 0016). Marumoto et al. does not specifically teach coating the glass substrate with an aluminum film. However, it would have been obvious to one skilled in the art at the time the invention was made to modify the method of Marumoto et al. by using metal such as aluminum for coating the glass substrate, because Marumoto et al. explicitly suggests using metal coating (see paragraphs 0001 and 0016) and metal containing aluminum is suitable (see Ni-%5 Al metal coating in the example of Marumoto et al.) and such modification would involve nothing more than use of known material for its intended use in a known environment to accomplish entirely expected result. The Courts have held that the selection of a known material, which is based upon its suitability for the intended use, is within the ambit of one ordinary skill in the art. See In re Leshin, 125 USPQ 416 (CCPA 1960) (See MPEP 2144.07).

Modified Marumoto et al. above does not specifically teach removing the aluminum film and the reaction products from the glass substrate by one or more chemical etching steps.

Yamada et al. discloses a method of texturing a substrate containing glass by forming a aluminum foil onto the substrate followed by heat and pressure, and removing the aluminum foil completely to leave only the substrate by chemical etching (see abstract, col. 2 lines 18-31,

example 1) to obtain extremely excellent result in roughening (or texturing) a substrate for extremely firm adhesion (see col. 2 lines 18-31, col. 4 line 55 through col. 5 line 2).

It would have been obvious to one skilled in the art at the time the invention was made to modify the method of Marumoto et al. by using chemical etching step to remove the aluminum layer completely to leave only the substrate as taught by Yamada et al., because Yamada et al. teaches such removing step would result in a extremely excellent roughened surface for attaining extremely firm adhesion (see col. 2 lines 18-31 and col. 4 line 55 through col. 5 line 2). Furthermore, such modification would involve nothing more than use of known method for its intended use (e.g. removing aluminum or metal layer) in a known environment to accomplish entirely expected result (e.g. roughening or texturing a substrate). In such a combination, the aluminum film and the reaction products from the substrate and the aluminum is removed by chemical etching because Yamada et al. describes removing the aluminum completely to leave only the substrate with textured surface (see example 1 of Yamada et al.).

Regarding claim 4, modified Marumoto et al. discloses a method of texturing a glass substrate as described in claim 1 above, wherein Marumoto et al. further teaches thermally spraying the metal layer containing aluminum (e.g. layer 2) under specific condition as seen in table 1. Therefore, the thermal annealing process is inherently conducted in a controlled ambient atmosphere.

Regarding claim 8, modified Marumoto et al. discloses a method of texturing a glass substrate as described in claim 1 above, in which an aluminum layer is coated on a SiO_2 glass substrate and heated and a reaction is occurred between the coated metal and the glass substrate

(see explanation in claim 1 above). While modified Marumoto et al. does not specifically teach the reaction product of aluminum bonding to SiO_2 glass substrate comprising aluminum oxide and/or silicon, it would have been inherent that the reaction product of the method of modified Marumoto et al. is aluminum oxide and/or silicon because modified Marumoto et al. teaches using the same materials such as aluminum and SiO_2 glass substrate and applying the same stimulating reaction step such as thermal annealing (see paragraphs 0009 and 0014 of Marumoto et al., as Marumoto et al. describes coat 2 of metal formed by thermal spraying or coating followed by sintering treatment) and because it is evidenced by Applicant's specification (see pages 2 and 4 of Applicant's specification, as Applicant describes the aluminum reacts spatially non-uniformly with the glass pane to form aluminum oxide and/or silicon).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marumoto et al. (JP 08-67535, see machine translation) in view of Yamada (US Patent 3876479) as applied to claims 1-2, 4, 6, 8-9, 11 and 19 above, and further in view of Oboodi et al. (US Patent 4794048).

Regarding claim 3, modified Marumoto et al. discloses a method of texturing a glass surface as set forth above, wherein the material film of metal is formed on the glass surface by spin coating, doctor blade or screen printing and followed by sintering treatment.

Modified Marumoto et al. does not specifically teach the thermal annealing process comprising a sequence of annealing steps at different temperatures (claim 3), or the reaction product comprising aluminum oxide and/or silicon (claim 8).

Oboodi et al. teaches bonding a metal film (e.g. 18) onto a glass surface (e.g. 16) by screen printing and followed by sintering (e.g. corresponding to instant thermal annealing

process), wherein the sintering step (or thermal annealing process) comprises a sequence of annealing steps at different temperatures (See Figure 3, col. 7 lines 14-36, col. 5 lines 25-27, col. 14 line 40 through col. 15 line 30, col. 8 line 36 through col. 14 line 39). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of modified Marumoto et al. by thermally annealing the glass and the material film of metal with a sequence of annealing steps at different temperature as taught by Oboodi et al, because Oboodi et al. teaches the thermal annealing process can be carried out in a single step or in multiple steps, wherein the multiple steps are preferred (See col. 13 lines 28-30), so that the binder and solvent in the suspension (e.g. used in the printing process, see col. 11 lines 48-64) can be removed. (see col. 14 line 40 through col. 15 line 30; col. 8 line 36 through col. 14 line 39 of Oboodi et al.).

7. Claims 1, 12-18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Shi et al. (WO 00/28602, submitted in IDS by Applicant) in view of Marumoto et al. (JP 08-67535), and further in view of Yamada et al. (US Patent 3876479)

Regarding claims 1, 12-13, 17-18 and 20, as seen in Figures 1-9, Shi et al. teaches a method of manufacturing a photovoltaic device comprising the steps of

- texturing a glass surface (see textured surface 12 of glass substrate 11 utilizing a method in claim 1 above.
- depositing a semiconductor film of amorphous or crystalline silicon (see silicon layer 15 in figures 1-9, see abstract and page 2 lines 28-30,) on the textured glass surface (e.g. 12), wherein the glass-facing surface of the semiconductor film

exhibits substantially the same degree of texture as the glass surface (see Figures 1-9). The semiconductor film is deposited in a manner such that substantially no gaps or voids exist between the textured glass surface and the semiconductor film. (as Shi et al. depicts no gaps or void between the textured glass surface 12 and the semiconductor film in Figures 1-9)

Shi et al. does not teach texturing the glass surface substrate utilizing a method as claimed in claim 1, paragraph 5 above.

Marumoto et al. in view of Yamada et al. discloses texturing a glass surface substrate as described in claim 1 above.

It would have been obvious to one skilled in the art at the time the invention was made to modify the method of Shi et al. by texturing the glass substrate as taught by modified Marumoto et al., because such modification would involve nothing more than use of known equivalent method for its intended use (e.g. texturing glass substrate by etching or by applying aluminum film) in a known environment to accomplish entirely expected result.

Regarding claims 14-16, Shi et al. discloses a method of making a photovoltaic device as described in claim 12 above. Shi et al. further discloses forming a dielectric barrier layer of silicon nitride (see barrier 31) between the glass (11) and the semiconductor (15) prior to the deposition of the semiconductor film (see the last paragraph of page 4).

8. Claims 12-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marumoto et al. (JP 08-67535, see machine translation) as applied to claims 1-2, 4-7, 11 and 19 above, in view of Shi et al. (WO 00/28602)

Regarding claims 12-13, 17-18 and 20, as seen in claim 1 above, Marumoto et al. teaches a method comprising steps of:

- texturing a glass surface utilizing a method in claim 1 above (see explanation in claim 1 above).

Marumoto et al. does not specifically teach depositing a semiconductor film on the textured glass surface to form a photovoltaic device as claimed.

Shi et al. teaches:

- depositing a semiconductor film of amorphous or crystalline silicon (see silicon layer 15 in figures 1-9, see abstract and page 2 lines 28-30,) on the textured glass surface (e.g. 12), wherein the glass-facing surface of the semiconductor film exhibits substantially the same degree of texture as the glass surface (see Figures 1-9). The semiconductor film is deposited in a manner such that substantially no gaps or voids exist between the textured glass surface and the semiconductor film. (as Shi et al. depicts no gaps or void between the textured glass surface 12 and the semiconductor film in Figures 1-9)

It would have been obvious to one skilled in the art at the time the invention was made to modify the method of Marumoto et al. by depositing a semiconductor film on the textured glass surface as taught by Shi et al., because Shi et al. teaches such modification would produce a photovoltaic device using textured glass substrate for light trapping to obtain higher efficiency in the cell (see lines 6-14 of page 1, and page 2 of Shi et al.)

Regarding claims 14-16, modified Marumoto et al. discloses a method of manufacturing a photovoltaic device as described in claim 12 above, wherein Shi et al. further discloses forming

a dielectric barrier layer of silicon nitride (see barrier 31) between the glass (11) and the semiconductor (15) prior to the deposition of the semiconductor film (see the last paragraph of page 4).

Response to Arguments

9. Applicant's arguments with respect to claims 1-4, 6, 8-9 and 11-20 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that Marumoto et al. teaches removing coating 2 by mechanically so that the substrate is textured by breaking off pieces of the substrate via the shearing stress of the mechanical removal, and the combination of Marumoto et al. with Yamada et al. or Shi et al. is improper because there can be no suggestion or motivation to modify Marumoto et al. The examiner respectfully disagrees. Marumoto et al. teaches texturing a substrate by applying a metal coating on the substrate so that a reaction occurs between the substrate and the coating (see paragraph 0014) thereby texturing substrate. Marumoto et al. teaches removing the coating 2 to leave behind the textured substrate by mechanical removal method. There is no where in Marumoto et al. describing texturing the substrate by breaking off pieces of the substrate as argued by Applicant. Yamada et al. discloses a method texturing a substrate by applying an aluminum coating on the substrate and removing the aluminum layer completely to leave only the textured substrate (see abstract, col. 2 lines 18-31, example 1) to obtain extremely excellent result in roughening (or texturing) a substrate for extremely firm adhesion (see col. 2 lines 18-31, col. 4 line 55 through col. 5 line 2). It would have been obvious to one skilled in the art at the time the invention was made to modify the method of Marumoto et al. by using chemical etching

step to remove the aluminum layer completely and leave only the substrate as taught by Yamada et al., because Yamada et al. teaches such removing step would result in a extremely excellent roughened surface for attaining extremely firm adhesion (see col. 2 lines 18-31 and col. 4 line 55 through col. 5 line 2). Furthermore, such modification would involve nothing more than use of known method for its intended use (e.g. removing aluminum or metal layer by chemical etching instead of by mechanical removal) in a known environment to accomplish entirely expected result (e.g. roughening or texturing a substrate). In such a combination, the aluminum film and the reaction products from the substrate and the aluminum is removed by chemical etching because Yamada et al. describes removing the aluminum completely to leave only the substrate with textured surface (see example 1 of Yamada et al.).

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to THANH-TRUC TRINH whose telephone number is (571)272-6594. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on 571-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TT
2/25/2011

/Basia Ridley/
Supervisory Patent Examiner, Art Unit 1725